

Additional Information for Voice Group Call Service

The present invention generally relates to the field of voice group services in mobile communication networks, and 5 in particular to Voice Group Call Services (VGCS).

Voice Group Call Service allows the establishment of a call between members of a group in numerous cells of the mobile telecommunication network simultaneously. These cells

10 define the service area. All subscribers belonging to the group have the possibility to listen to the call in the service area. It is also possible to participate in the call individually. Service subscribers of the radio network can become group members on a network wide basis to one or 15 more groups pre-defined in the network by a corresponding group identification (group ID). The membership enables them to receive voice group calls associated with that group ID. In addition, certain group members are entitled by their subscription to initiate Voice Group Calls (VGC).

20 In addition to subscriber details in the Home Location Register (HLR), it is necessary for the mobile station (MS) to be aware of its group membership by storing details on the Subscriber Identity Module (SIM). This is required because it responds to notification messages which include 25 only the group call relevant information, (i.e. no IMSI or TMSI details). Having become a group member, each service subscriber can set to active state or deactivate state the group ID or any one out of his several group IDs on the SIM. In active state the subscriber can initiate VGCs to 30 that group ID. When in deactivate state the subscriber can not make VGCs to the group and the mobile station ignores any notification for that group ID.

A group call area can be restricted to a single Mobile Switching Center (MSC) area or can exceed one MSC area (implementation option). A voice group call is initiated by 5 a calling subscriber by a related man machine interface action for the service selection and the group ID dialled. The MSC in which the voice group call is initiated obtains by requesting a Group Call Register GCR the group call attributes. The GCR is a functionality in the network 10 containing the group call attributes. This GCR interrogation after call initiation also determines whether the MSC acts as group call Anchor- or as group call Relay-MSC. A group call Anchor-MSC is responsible for managing and maintaining a particular VGC. The group call Anchor-MSC 15 is determined as the one controlling the cells of the group call area. For VGCSSs where the group call area exceeds an MSC area, the group call Anchor-MSC is predefined in the network. A group call Relay-MSC controls cells of a group call area which are not under control of the group call 20 Anchor-MSC for those voice group call services where the group call area exceeds one MSC area.

If the MSC is not the Anchor-MSC then the call will be "forwarded" from the Relay-MSC to the respective Anchor-MSC 25 (information also delivered by GCR) and further "call-establishment" is done by the Anchor-MSC.

When a calling subscriber (talker) initiates a voice group call, one voice group call channel is established in each cell of the group call area and notifications for that call 30 is sent in each of these cells. A voice group call channel is a downlink to be allocated in each cell of the group call area for a particular voice group call. All mobile

stations being service subscribers for that Voice Group Call in one cell listens to the common downlink. All mobile stations of the listening service subscribers in one cell only listens to the same common downlink (voice group call 5 channel). Of course it is possible to change the talker at any time, so that one of the listeners of the group becomes the talker and the previous talker becomes a listener.

It is the object of the invention to enhance the 10 conventional voice group call service by providing an additional communication service.

This object is achieved by providing a method and a communication system as disclosed in the independent 15 claims.

Other features which are considered to be characteristic for the invention are set forth in the appended claims
20 The additional information for Voice Group Call Service (VGCS) is designed to provide all active members of a VGCS in parallel, i.e. simultaneous to an ongoing voice group call, with additional information, for example the tactical addresses of the current talker. The information contained 25 here may have a text-oriented or binary-oriented character.

The transmission of the additional information shall be realised only in acknowledged mode and is sent on the Slow Associated Control Channel (SACCH), which represents an 30 associated control channel for the downlink traffic channel of the voice group call.

In the following the invention will be described with reference to the appended drawings.

Figure 1 shows a functional voice group call architecture
5 with a group call register.

Figure 2 shows a transfer of additional information to members of a VGCS.

10 The general architecture of GSM is maintained. In addition, a network function is required which is used for registration of the group call attributes, the group call register (GCR) 10a, 10b, 10c. The GCR function is mainly a database function, holding information about voice group
15 calls. The signalling between the entities shown in figure 1 shall be as defined in the following.

The Mobile Switching Center (MSC) 12a, 12b, 12c containing the cell within which this voice group call is initiated
20 performs subscription checking against Visitor Location Register (VLR) 14a, 14b, 14c and Home Location Register 16 records. It then consults its GCR 10a, 10b, 10c, respectively, to determine the group call attributes related to its MSC area and whether it is the group call
25 Anchor-MSC 12a for that voice group call. If it is not, the GCR provides with the group call reference and the routing information identifying the group call Anchor-MSC 12a to the originating MSC. The originating MSC then routes the voice group call to the Anchor-MSC 12a. If the originating
30 MSC is the group call Anchor-MSC 12a, along with the group call attributes, the respective GCR 10a provides

information on all group call Relay-MSCs 12b, 12c to be involved. The group call Anchor-MSC 12a sets up links to all group call Relay-MSCs 12b, 12c. Each MSC 12a, 12b, 12c involved in a voice group call obtains its proper group 5 call attributes from the GCR 10a, 10b, 10c related to the respective MSC.

The GCR 10a, 10b, 10c holds for a related MSC area for each group ID and cells from which voice group calls can be 10 established by service subscribers the group call reference to be used for a voice group call to be established and an indication whether the originating MSC is the group call Anchor-MSC 12a. If the originating MSC is the group call Anchor-MSC 12a, the GCR 10a provides the group call 15 attributes related to that group call reference to the originating MSC and the originating MSC establishes the voice group call. If the originating MSC is not the Anchor-MSC 12a, the GCR 10a provides the group call reference plus the routing information identifying the Anchor-MSC 12a to 20 the originating MSC and the originating MSC routes the voice group call to the Anchor-MSC 12a.

According to the invention, an additional information can be forwarded to all group members during an ongoing voice 25 group call. This is preferably done by transmitting a message containing the additional information on the associated control channel for the traffic channel of the voice group.

30 The MSC 12 (either Anchor- or Relay-MSC) triggers via an appropriate message, e.g. an additional-information-request-message, on the A-interface the base station

subsystem (BSS) 20 to send the additional information to the mobile stations MS 22, 24 of the group members, i.e. one talker 22 and at least one listener 24. The message contains at least the additional information itself. The 5 VGC-ID or VGC-Reference represents an optional part of this message.

In the case where the message is sent on the controlling 10 SCCP-connection (Signalling Connection Control Part connection) of the VGC, the addressing which VGC is meant is not necessary.

In addition to this, the message, i.e. the additional- 15 information-request-message, can be sent on the resource controlling SCCP-connections.

Afterwards, the BSS 20 transmits the additional information on the SACCH of all TCHs where the VGC is ongoing, so that the additional information can be received by all MS 22, 24 20 participating the voice group. The provisioning of the additional information in radio cells which are belonging the VGC-area but in which a VGC-channel is not established is not necessary.

25 In the case that the additional information is sent on the controlling SCCP-connection, the BSS 20 is responsible to transmit the additional information on all SACCHs for this VGC.

30 After having sent the additional information, the BSS 20 provides an acknowledge information to the MSC 12 that the additional information was sent to the mobile stations 22,

24. However, this acknowledge information does not confirm to the sender of the message that the individual members of a voice group call have received the message.

5 In order to give an indication that the additional information was at least received by the current talker 22, the talker 22 may send an acknowledgement on the Uplink-SACCH for this VGC.

List of reference numerals and abbreviations

| | | |
|----|---------------|------------------------------------|
| | 10a, 10b, 10c | Group Call Register |
| 5 | 12a, 12b, 12c | Mobile Switching Center |
| | 14a, 14b, 14c | Visitor Location Register |
| | 16 | Home Location Register |
| | 18 | Gateway Mobile Switching Center |
| | 20 | Base Station Subsystem |
| 10 | 22 | MS (Talker) |
| | 24 | MS (Listener) |
| | | |
| | BSS | Base Station Subsystem |
| 15 | MS | Mobile Station |
| | MSC | Mobile Switching Centre |
| | SACCH | Slow Associated Control Channel |
| | SCCP | Signalling Connection Control Part |
| | TCH | Traffic Channel |
| 20 | VGC | Voice Group Call |
| | VGCS | Voice Group Call Service |